

1. A method for removing a first sorbate and a second sorbate from a sorbent, the first sorbate in combination with the sorbent having a first desorption activation energy and the second sorbate combination with the sorbent having a second desorption activation energy higher than the first desorption activation energy, the method comprising the steps of:

contacting the first sorbate, the second sorbate, and the sorbent in a first stage with a stripping fluid having a first temperature sufficient to separate and release a portion of the first sorbate in a vapor phase from the second sorbate and the sorbent;

combusting the first sorbate;

heating the second sorbate and the sorbent to a second temperature higher than the first temperature to separate at least a portion of the second sorbate in a vapor phase from the sorbent; and

condensing the second sorbate to change the second sorbate from the vapor phase to the liquid phase.

2. The method recited in Claim 1, wherein:

the contacting step occurs in a first desorption phase; and

the heating step occurs in a second desorption stage following the first desorption stage.

3. The method recited in Claim 2 wherein the first temperature of the stripping fluid is sufficiently high to produce the first desorption activation energy associated with the first sorbate.

4. The method recited in Claim 3 wherein the second temperature is sufficiently high to produce the second desorption deactivation energy associated with the second sorbate.

5. The method recited in Claim 1 wherein the heating step includes the step of:

exposing the second sorbate and the sorbent to one of microwave energy and infrared energy to heat the second sorbate and the sorbent to the second temperature.

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6. The method recited in Claim 5 wherein the heating step further comprises the step of:

10 during the exposing step contacting the second sorbate and the sorbent with a stripping fluid having a temperature of at least the second temperature.

7. The method recited in Claim 1 wherein the first temperature is in a range between 40 degrees centigrade and 100 degrees centigrade.

8. The method recited in Claim 1 wherein the first sorbate includes formaldehyde.

9. The method recited in Claim 8 wherein the second sorbate includes a terpene.

10. The method recited in Claim 1 wherein the sorbates are volatile organic chemicals.

11. The method recited in Claim 1 further comprising the step of heating wood to dry the wood and release volatile organic chemicals for sorption relative to the sorbent.

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12. A process for removing a first sorbate and a second sorbate from a sorbent, the first sorbate in combination with the sorbent having a first desorption activation energy and the second sorbate combination with the sorbent having a second desorption activation energy higher than the first sorption energy, the method comprising the steps of:

5 contacting the first sorbate, the second sorbate and the sorbent in a first desorption chamber with a fluid having a first temperature to separate the first sorbate in a vapor phase from the second sorbate and the sorbents;

10 disposing of the first sorbate;

heating the second sorbate and the sorbent to a second temperature in a second desorption chamber to separate the second sorbate in a vapor phase from the sorbent;

condensing the second sorbate in the vapor phase to change the second sorbate to the liquid phase; and

selling the second sorbate to offset the costs of the process.

13. The process recited in Claim 12 wherein the heating step includes the steps of:

generating one of microwave or infrared energy; and

25 using the one energy to heat the second sorbate to the second temperature to separate the second sorbate in the vapor phase from the sorbent.

14. The process recited in Claim 13 wherein during the heating step, the process further comprises the step of introducing a purging gas into the second desorption chamber.

30 15. The process recited in Claim 14 wherein prior to the introducing step the method includes the step of heating the purging gas to at least the second temperature.

16. A method for removing a first sorbate and a second sorbate from a sorbent, the first sorbate in combination with the sorbent having a first desorption activation energy and the second sorbate combination with the sorbent having a second desorption activation energy higher than the first desorption activation energy, the method comprising the steps of:

contacting the first sorbate, the second sorbate, and the sorbent in a desorption chamber with a fluid having a first temperature to separate the first sorbate in a vapor phase from the second sorbate and the sorbent;

disposing of the first sorbate in the vapor phase;

following the contacting step, heating the second sorbate and the sorbent in the desorption chamber to a second temperature sufficient to separate the second sorbate in a vapor phase from the sorbent; and

condensing the second sorbate in the vapor phase to change the second sorbate to the liquid phase.

17. The method recited in Claim 16 wherein during the heating step the method further comprises the step of introducing a purging gas into the desorption chamber.

18. The method recited in Claim 17 wherein prior to the introducing step the method includes the step of heating the purging gas to the second temperature to facilitate desorption of the second sorbate from the sorbent.

19. Apparatus for removing a first sorbate and a second sorbate from a sorbent, the first sorbate in combination with a sorbent having a first desorption activation energy and the second sorbate in combination with the sorbent having a second desorption activation energy higher than the first desorption activation energy, comprising:

5 a first desorption stage adapted to process the sorbent with the first sorbate and the second sorbate;

10 means for heating the first sorbent, the first sorbate and the second sorbate in the first desorption stage to produce the first desorption activation energy in order to desorb at least a portion of the first sorbate from the sorbent;

means for disposing of the first sorbate desorbed in the first desorption stage;

a second desorption stage adapted to process the sorbent with the second sorbate and any first sorbate remaining from the first stage;

20 means for heating the sorbent, the second sorbate and any first sorbate remaining from the first stage, in the second desorption stage to produce the second desorption activation energy sufficient to desorb at least a portion of the second sorbate from the sorbent; and

means for disposing of the second sorbate desorbed in the second desorption stage.

20. The apparatus recited in Claim 19 further comprising:

25 a first desorption chamber for receiving the sorbent with the first sorbate and the second sorbate during the first desorption stage; and

30 a second desorption chamber for receiving the sorbent with the second sorbate and any remaining first sorbate, during the second desorption stage.

21. The apparatus recited in Claim 19 further comprising a desorption chamber adapted to process the sorbent during both the first desorption stage and the second desorption stage.

5 22. The apparatus recited in Claim 19 further comprising:

a desorption chamber adapted to process the sorbate during the second desorption stage;  
and

10 a generator for introducing one of microwave energy and infrared energy into the desorption chamber.

15 23. The apparatus recited in Claim 22 further comprising means for introducing a purging gas into the desorption chamber during the second desorption stage.

20 24. The apparatus recited in Claim 23 further comprising means for heating the purging gas to a temperature sufficient to produce the second desorption activation energy.